

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-44. (Canceled)

45. (New) A wafer processing tool including an integrated wafer inspection station, comprising:

a plurality of wafer processing slots, each wafer processing slot shaped to contain any of a plurality of wafer processing stations;

at least one wafer handler operable to transport wafers between any of the plurality of wafer processing slots;

a wafer inspection station dimensioned to be contained within one of the plurality of wafer processing slots to receive a wafer from the wafer handler, the wafer inspection station including an optical measurement system forming a scatterometry instrument that is moveable to specified locations over a wafer in the wafer inspection station in order to direct a light beam as a spot onto patterned features of the wafer and obtain characteristic optical signatures for the illuminated patterned features; and

a data processor operable to receive and analyze the characteristic optical signatures in order to analyze the wafer after processing in any of the plurality of wafer processing stations, the data processor being further operable to alter the processing of the wafer in the wafer processing tool based on the characteristic optical signatures.

46. (New) A tool according to claim 45, wherein:

the data processor alters the processing of the wafer by sending the wafer for further processing in one of the wafer processing stations having already processed the wafer.

47. (New) A tool according to claim 45, wherein:

the data processor alters the processing of the wafer by changing the processing parameters in a wafer processing station yet to process the wafer.

48. (New) A tool according to claim 45, wherein:

the data processor alters the processing of the wafer by changing the order in which the wafer visits the plurality of wafer processing slots.

49. (New) A tool according to claim 45, wherein:

the data processor is operable to use a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by any of the wafer processing stations can be analyzed.

50. (New) A tool according to claim 45, wherein:

the optical signatures include independent optical parameters selected from the group consisting of wavelength, incidence angle, and altitude and azimuthal collection angles.

51. (New) A tool according to claim 45, wherein:

the optical measurement system includes an objective lens imaging light from the spot on the wafer, the optical measurement system forming a low numerical aperture (NA) system with an $NA < 0.4$ for optimum scatterometry.

52. (New) A tool according to claim 45, wherein:

the wafer inspection station includes an x-y stage driving the optical measurement system and a wafer support holding the wafer stationary within the wafer inspection station.

53. (New) A wafer inspection station for integration within a wafer processing tool, the wafer inspection station dimensioned to be contained within any of a plurality of processing slots in a wafer processing tool and operable to receive a wafer from a wafer handler for transporting wafers between any of the plurality of processing slots, comprising:

an optical measurement system forming a scatterometry instrument that is moveable to specified locations over a wafer in the wafer inspection station in order to

direct a light beam as a spot onto patterned features of the wafer and obtain characteristic optical signatures for the illuminated patterned features; and

a data processor operable to receive and analyze the characteristic optical signatures in order to analyze the wafer after processing in a wafer processing station in any of the plurality of wafer processing slots, the data processor being further operable to alter the processing of the wafer in the wafer processing tool based on the characteristic optical signatures.

54. (New) A station according to claim 53, wherein:

the data processor alters the processing of the wafer by sending the wafer for further processing in a wafer processing station having already processed the wafer.

55. (New) A station according to claim 53, wherein:

the data processor alters the processing of the wafer by changing the processing parameters in a wafer processing station yet to process the wafer.

56. (New) A station according to claim 53, wherein:

the data processor alters the processing of the wafer by changing the order in which the wafer visits the plurality of processing slots.

57. (New) A station according to claim 53, wherein:

the data processor is operable to use a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by a wafer processing station can be analyzed.

58. (New) A station according to claim 53, wherein:

the optical signatures include independent optical parameters selected from the group consisting of wavelength, incidence angle, and altitude and azimuthal collection angles.

59. (New) A station according to claim 53, wherein:

the optical measurement system includes an objective lens imaging light from the spot on the wafer, the optical measurement system forming a low numerical aperture (NA) system with an $NA < 0.4$ for optimum scatterometry.

60. (New) A station according to claim 53, further comprising:

an x-y stage operable to drive the optical measurement system; and
a wafer support operable to hold the wafer stationary within the wafer inspection station.

61. (New) A method of inspecting a wafer within a wafer processing tool, comprising the steps of:

transferring a wafer from any of a plurality of wafer processing stations in a plurality of wafer processing slots of the wafer processing tool to a wafer inspection station, dimensioned to be contained within a wafer processing slot, using a wafer handler operable to transfer wafers between any of the plurality of processing slots;

positioning a measurement spot of an optical head of a measurement instrument within the wafer inspection station over at least one location on the wafer and measuring an optical characteristic of the wafer at each location using a scatterometry instrument;

analyzing the optical characteristic to obtain a measure of the surface of the wafer; and

altering the processing of the wafer in the wafer processing tool based on the characteristic optical signatures.

62. (New) A method according to claim 61, wherein:

altering the processing of the wafer includes sending the wafer for further processing in one of the wafer processing stations having already processed the wafer.

63. (New) A method according to claim 61, wherein:

altering the processing of the wafer includes changing the processing parameters in a wafer processing station yet to process the wafer.

64. (New) A method according to claim 61, wherein:
altering the processing of the wafer includes changing the order in which the wafer visits the plurality of wafer processing slots.
65. (New) A method according to claim 61, wherein:
analyzing the optical characteristic includes using a scattering model for possible periodic structures on the wafer to obtain a measure of the patterned features on the wafer so that a process carried out by any of the wafer processing stations can be analyzed.